A Multisite Neurobehavioral Assessment of Fetal Alcohol Spectrum Disorders (FASD)

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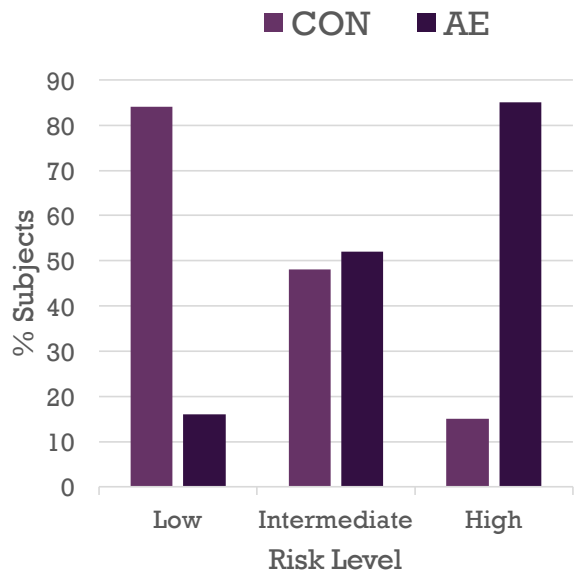
Highlights from the CIFASD Neurobehavioral Project

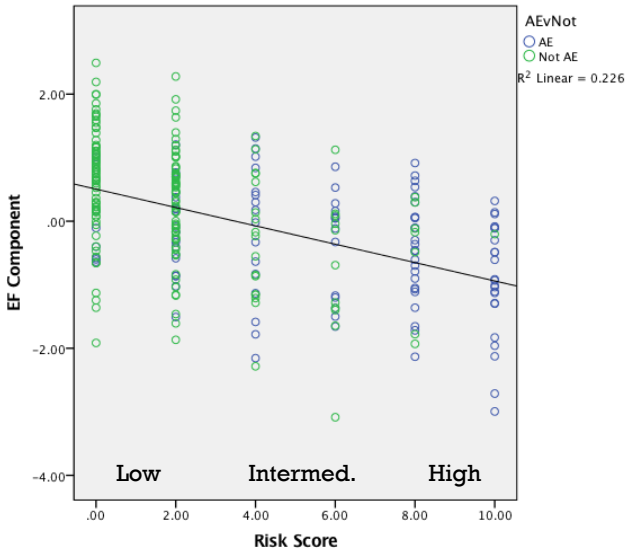
- Data Collection: Tested >825 subjects
  - Subjects with histories of prenatal alcohol exposure, contrast subjects with other behavioral concerns and conditions, and typically developing controls.
- Decision Tree
  - Developed decision tree model using CIFASD 2 data
  - Validated model using CIFASD 3 data in both 10-16 and 5-7 year olds
  - Included diverse comparison groups in both development and validation studies and both age groups in validation study
  - Paper Published in Journal of Pediatrics (Goh et al., 2016)
- Risk Scores
  - Following up on Decision Tree with Risk Scores showing low, intermediate, high risk of alcohol effects
- Four Studies of Memory
  - Examined effects of age and sex on multiple neuropsychological measures, including memory. Paper Published in ACER (Panczakiewicz et al., 2016)
  - Examined neural correlates of memory function (on the CVLT-C). Paper Published in Brain Imaging and Behavior (Gross et al., 2017)
  - Examined multiple memory measures in 2 age groups and 3 subject groups. Paper in preparation (Gross et al.)
  - Compared CVLT-C performance in alcohol-exposed youth and controls. Paper in preparation (Panczakiewicz et al.)

Risk Scores for Identification of Alcohol-Affected Children

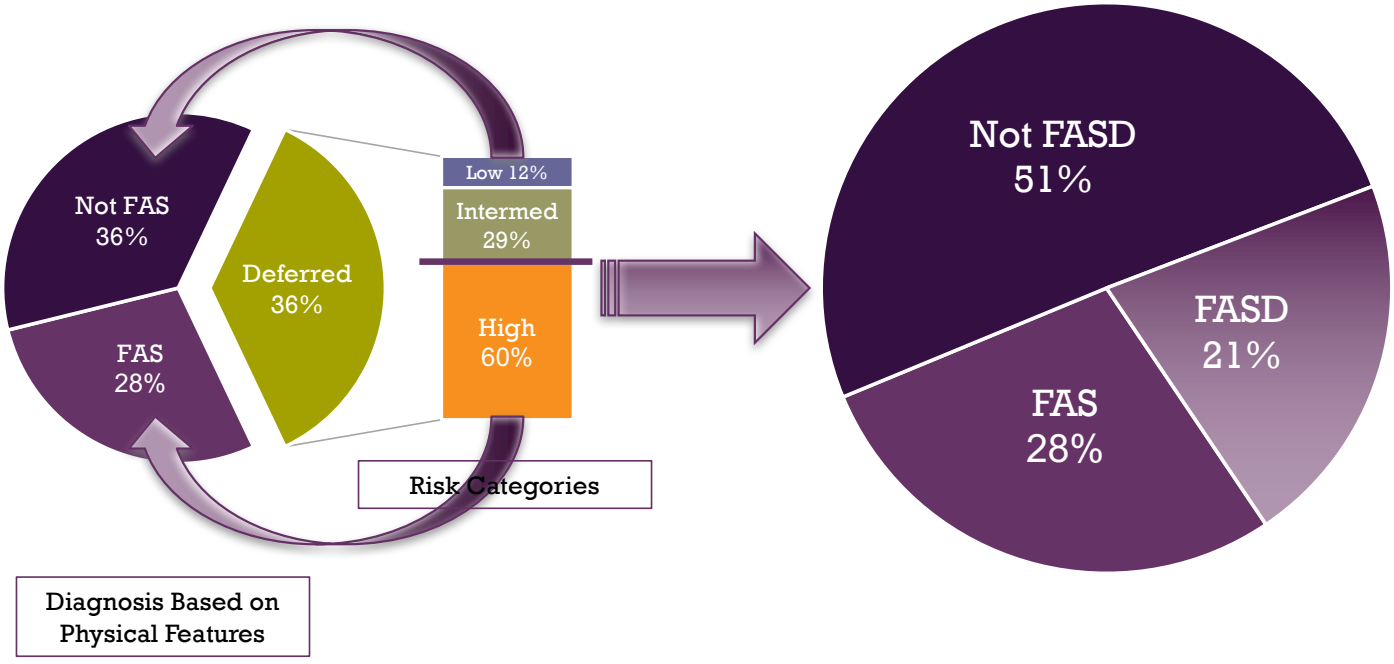
Risk Categories and Exposure



Correlations with EF



Risk Scores Help Improve Diagnosis



Current Focus

- Explore utility of the Decision Tree using data from lower risk samples from U.S. prevalence studies and the CIFASD Ukraine study
- Develop an internet-based or mobile app version of the Decision Tree for identification of children affected by prenatal alcohol exposure
  - Validate results with advanced neuropsychological test data
- Develop, implement, and validate online neurobehavioral screening tools for use with subjects recruited through the CIFASD web portal
  - Validate results with advanced neuropsychological test data

September 2017

Mattson Timeline for Year 1 (July-May)

	Aim 1a (Archival Data)	Aim 1b (eTree)	Aim 1c/2b (Validation)	Aim 2a (FONS)
Collaborators	Chambers	Jones, Wozniak, Admin Core	Jones, Wozniak, Foroud	Foroud, Hammond
Interactions	In email contact, reviewing data dictionaries (coFASP/CIFASD)	In touch via in-person and phone meetings	In touch via in-person and phone meetings. Have regularly scheduled monthly call, need to schedule additional calls	✓Schedule monthly conference call with with TF and SM
July-August	✓ IRB Approval ✓Request Data (in process)	✓ IRB Approval ✓Hiring ✓Training ✓eTree Development ✓Programming (Admin Core) ☐ Establish subcontract ✓ Practice Clinic 9/13/17	✓Hiring ✓Purchasing NP Materials ✓Training on Battery (local) ✓Training on Battery (UMN) Scheduled 9/8-9 ☐ Transition to electronic data collection ☐ Pilot Testing	✓ FONS Planning ☐ FONS Development ☐ FONS Programming (Admin Core) ☐ Piloting
September	☐ Obtain Data ☐ Begin Data Analysis			
October-December	☐ Data Analysis ☐ Preliminary Results	☐ Make adjustments to eTree App ☐ Data Collection in San Diego and Minnesota		
Jan-March	☐ Refine Tree, Rerun Analyses (if needed)			
April - May (June)	☐ Present Results at RSA ☐ Prepare Manuscript		☐ Data Collection	

eTree App – Old School

Call #: _____ Date: _____

Decision Tree/Risk Score Calculations

CBCL

Somatic Complaint T-Score: ____
Social Problems T-Score: ____
Thought Problems T-Score: ____
Attention Problems T-Score: ____
Rule Breaking Behavior T-Score: ____
Aggressive Behavior T-Score: ____
☐ 1 or more > 65

VABS (1 & 2)

Socialization Standard Score: ____
Communication Standard Score: ____
Daily Living Skills Standard Score: ____
☐ 2 or more < 86

Dysmorphology 1

PFL Percentile < 10%: Yes No
Smooth Philtrum (4/5): Yes No
Thin Vermilion Border (4/5): Yes No
☐ 1 or more "Yes"

Dysmorphology 2

Camptodactyly: Yes No
Ptosis: Yes No
☐ 1 or more "Yes"

IQ

FSIQ/GCA Score: ____
☐ IQ/GCA <92

FAS

Meet Criteria: Yes No

Risk Score

For each domain, if box is checked assign a point value of 1. If not checked, assign a point value of 0

Risk Formula = 1*(CBCL) + 2*(*VABS*) + 1*(*DYS1*) + 1*(*DYS2*)

Risk Score = 1*(__) + 2*(__) + 1*(__) + 1*(__)

Score of: 0/1 = low risk 2/3 = intermediate risk 4/5 = high risk
If FAS, Risk = High

Risk Score = _____

Risk of AE = _____

Decision Tree

Entry Point #1

CBCL box checked? Yes No
*If "Yes" continue to Entry Point #2
If "No" is IQ box checked? Yes No
*If "Yes" continue to Entry Point #2
If "No" ***Proposed Non-AE***

Entry Point #2

Meet criteria for FAS box checked? Yes No
*If "Yes" – ***Proposed AE***
If "No" is DYS1 box checked? Yes No
*If "Yes" continue to VABS (2)
If "No" continue to VABS (1)

VABS(2) box checked? Yes No
*If "Yes" – ***Proposed AE***
If "No" – ***Proposed Non-AE***

VABS(1) box checked? Yes No
*If "Yes" – ***Proposed AE***
If "No" continue to DYS2

DYS(2) box checked? Yes No
*If "Yes" – ***Proposed AE***
If "No" – ***Proposed Non-AE***

Tree Result = YES or NO (circle)

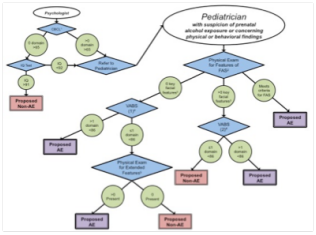
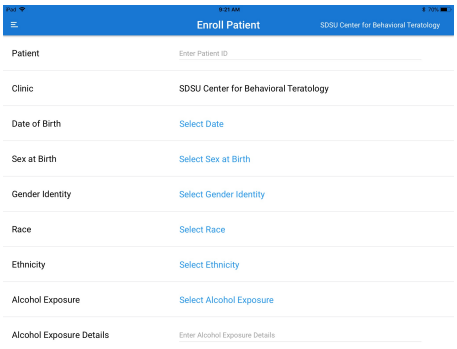


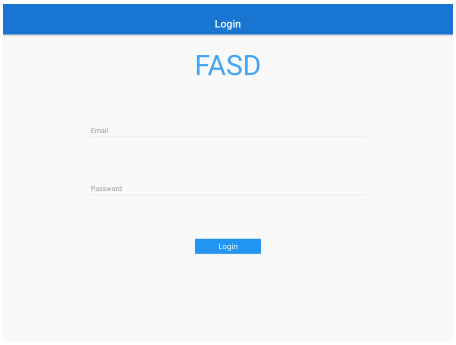
Table II. Variables and cut-off criteria for each measure included in final decision tree

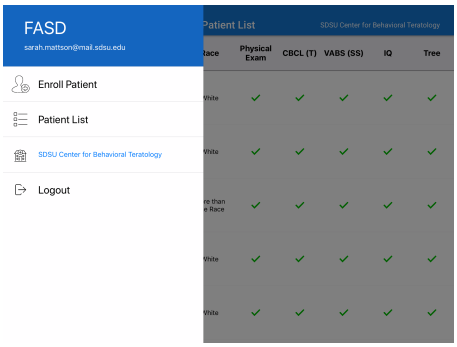
Decision points	Description	Selected variables	Cut-off score for decision point
Child Behavior Checklist (CBCL)[29]	Parent-reported problem behaviors	Thought Problems, Attention Problems, Social Problems, Aggressive Behavior, Rule-Breaking Behavior, Somatic Complaints	>0 Subscales with T-scores >65
IQ test	Direct measures of general cognitive ability	FSIQ or GCA	FSIQ/GCA <92
(WISC-IV/DAS-II)[30,31] Physical exam for key features of FAS	Physical measurements from dysmorphology exam consistent with a diagnosis of FAS[32,33]	Palpebral fissure length ≤10 percentile, vermilion border lipometer score = 4 or 5, philtrum lipometer score = 4 or 5, head circumference ≤10th percentile, height and/or weight ≤10th percentile	Meeting criteria for FAS* or >0 key facial features
Physical exam for extended features	Physical measurements from dysmorphology exam included in the expanded range of effects of prenatal alcohol exposure[33]	Ptosis, incomplete extension of digits	>0 criteria
VABS (1) and VABS (2)[34]	Parent-reported adaptive functioning	Socialization, Communication, Daily Living Skills	>1 Domain with standard scores ≤86

DAS-II: Differential Ability Scales – Second Edition; VABS: Vineland Adaptive Behavior Scales-II; WISC-IV: Wechsler Intelligence Scale for Children-Fourth Edition.
*FAS diagnoses requires at least 2 of 3 key facial features (palpebral fissure length ≤10th percentile, philtrum lipometer score = 4 or 5; vermilion border lipometer score = 4 or 5), and presence of head circumference ≤10th percentile or height and/or weight ≤10th percentile.[31,34]
†VABS (1) and VABS (2) refer to the same variables from the Vineland Adaptive Behavior Scale but are used at 2 different decision points in the decision tree model.

FASD eTree App and Website







Current Status: Trying to break it, tweaking the algorithm, testing
Wish List: Add ND-PAE criteria, educational content, tree flow-chart

Validating NP Test Battery

WISC-V	Block Design*
WISC-V	Similarities*
WISC-V	Matrix Reasoning*
WISC-V	Digit Span*
WISC-V	Coding*
WISC-V	Vocabulary*
WISC-V	Figure Weights*
WISC-V	Symbol Search
D-KEFS	Trail Making
D-KEFS	Verbal Fluency
D-KEFS	Color-Word Interference
WIAT-III	Numerical Operations
WIAT-III	Word Reading
WIAT-III	Math Problem Solving
NIH Toolbox	Picture Sequence Memory
NIH Toolbox	Dimensional Change Card Sort
NIH Toolbox	Flanker Inhibitory Control and Attention
NIH Toolbox	List Sorting Working Memory